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Supernova hydrodynamics experiments using the Nova laser,*

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In studying complex astrophysical phenomena such as supernovae, one does not have the luxury of setting up clean, well controlled experiments in the universe to test the physics of current models and theories. Consequently, creating a surrogate environment to serve as an experimental astrophysics testbed would be highly beneficial. The existence of highly sophisticated, modern research lasers, developed largely as a result of the world-wide effort in inertial confinement fusion, opens a new potential for creating just such an experimental testbed utilizing well-controlled, well-diagnosed laser-produced plasmas. Two areas of physics critical to an understanding of supernovae that are amenable to supporting research on large lasers are discussed: (1) compressible nonlinear hydrodynamic mixing[1,2] and (2) radiative shock hydrodynamics[2]. Results of initial experiments utilizing the Nova laser will be presented, and the astrophysics implications will be discussed. *Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

[1]J. Kane *et al.*, in press, Astrophys. J. Lett. (1997).

[2]B.A. Remington *et al.*, in press, Phys. Plasmas (May, 1997).